

WHAT IS CLAIMED IS:**1. A pointing device comprising:**

5 an elongated body having a transparent end adapted for movement over a surface;

an illumination subsystem that illuminates said surface in an area adjacent to said transparent end;

10 an imaging subsystem that forms images of a portion of said surface in said area;

a reference mark system that defines a direction that is independent of the rotations of said elongated body; and

15 a controller that periodically compares two of said images, said comparison depending on the amount by which said elongated body rotated between said images.

2. The pointing device of Claim 1 wherein said reference mark system comprises:

20 a disk that is free to rotate about an axis through said disk, said disk comprising a reference mark that is displaced from said axis, said disk having an orientation mechanism that maintains said disk in a fixed orientation relative to the earth; and

a sensor for determining the location of said reference mark relative to said elongated
25 body.

3. The pointing device of Claim 2 wherein said orientation mechanism comprises a weight on said disk, said weight being displaced from said axis.

30 4. The pointing device of Claim 2 wherein said orientation mechanism comprises a magnet attached to said disk.

5. The pointing device of Claim 2 wherein said sensor comprises an optical system for projecting an image of said disk into said imaging subsystem.

6. The pointing device of Claim 2 wherein said sensor comprises a reference mark
5 sensor that measures the orientation of said disk relative to said elongated body.